

LOCOMOTIVE PERSONAL ALERT SYSTEM

TECHNICAL FIELD

The invention relates generally to an apparatus for maintaining alertness in vehicle operators and more particularly to an apparatus for maintaining alertness in locomotive operators.

BACKGROUND OF THE INVENTION

Impaired alertness in vehicle operators is a serious problem, particularly in locomotives which travel at a constant rate of speed for extended periods of time. Existing alert systems require the operator to reset a timer at regular intervals in response to a signal light by pressing a button or operating one of the controls. The system must be reset within a specified time period following the visual cue or an audible alarm is sounded. If the system is not reset within a second specified time period following the alarm the train is stopped. The simplicity of the response which resets the system is not indicative of the level of alertness required for safe vehicle operation. An experienced operator is able to reset the system when dozing or otherwise impaired.

Alertness monitoring systems in which a visual cue followed by an audible alarm precedes inactivation of the vehicle are well known. U.S. Pat. No. 3,611,344 to Couper describes a system for initiating conscious activity of a vehicle operator in which a visual alarm signal is automatically and periodically activated. The operator must promptly manually deactivate the visual alarm signal or an audible alarm is generated. If the audible alarm is not promptly manually deactivated the vehicle engine is disabled and an external alarm is initiated.

Devices which require the operator of a vehicle to periodically perform a task in order to prevent activation of an alarm are also known. U.S. Pat. No. 4,234,051 to Morris describes a device in which the operator of a vehicle must increase the quantity in a countdown timer by pressing a reset button. When the countdown timer reaches a predetermined quantity the throttle of the vehicle is switched into an idle position. The operator may selectively control the value by which the quantity in the countdown timer is increased. U.S. Pat. No. 5,012,226 to Love describes an operator alertness device which requires that a switch be operated within an adjustable time period to prevent activation of a first visual alarm. Failure to operate the switch within a second time period results in sounding of a second audible alarm which remains activated until the switch is operated.

Devices which compare some quality of the operator's response to a standard are also known. U.S. Pat. No. 4,359,725 to Balogh et al. describes a system for monitoring the alertness of the driver of a vehicle by prompting the driver with an auditory cue, then briefly lighting one of the turn signal indicator lamps on the instrument board and measuring the time it takes the driver to switch the corresponding turn signal control on and off. If the driver fails to respond, or the response time has deteriorated sufficiently, an alarm is given. U.S. Pat. No. 3,794,968 to Hill describes a system for testing fitness to drive a motor vehicle in which a subject must turn a knob at a time varying rate to match a hidden signal which varies at a predictable non-uniform rate. The subject is given cues which are limited to whether the rate at which the knob is turning is greater

or less than the signal change rate. The system is not designed to be used during operation of a vehicle.

The prior art devices for use during operation of a vehicle do not require the operator to perform a task sufficiently complicated to reliably indicate a safe level of alertness. The operator of a vehicle must be able to evaluate complex visual information and respond appropriately to variable situations.

It is therefore an object of the invention to provide an improved alertness monitoring system which requires an operator to uniquely respond to variable visual cues.

It is a further object to provide an improved alertness monitoring system which presents visual cues in an unpredictable manner.

It is a further object to provide an improved alertness monitoring system capable of sensing a vehicle's speed and bringing it to a smooth, controlled stop.

SUMMARY OF THE INVENTION

The present invention tests the alertness of the vehicle operator by displaying a randomly selected visual symbol pattern, such as a set of alpha-numeric characters, which the operator must repeat from a keyboard within a set time period. The pattern is displayed on a screen or projected on the vehicle windshield at randomly selected intervals during normal train operation. If the displayed numbers are not entered within a set time period an audible alarm is sounded and the operator is given an additional set time period within which to enter the numbers correctly. If the correct numbers have not been entered at the end of the second time period the system disables the throttle and engages the brakes. The system also includes an alarm event counter which disables the throttle and engages the brakes if a preset number of consecutive alarms occur. The alarm event counter is reset to zero when the system is first enabled and every time the correct numbers are entered before the audible alarm is sounded. The system includes a speedometer sensor. When the vehicle has been in continuous forward motion for a set period of time the system is enabled. Input from the speedometer is also utilized by the system to apply the brakes in a controlled manner so that the vehicle is brought to a smooth stop within a specific period of time and distance. The system also includes a pair of sensors for detecting when the vehicle is being remotely operated. When the vehicle is being operated remotely the personal alert system is deactivated.

An advantage of the alertness monitoring system of the present invention is that it requires an operator to uniquely respond to a variable visual cue.

Another advantage is that the alertness monitoring system presents visual cues in an unpredictable manner.

A further advantage is that the alertness monitoring system is capable of sensing the vehicle's speed and bringing it to a smooth, controlled stop.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block circuit diagram of the alertness monitoring system of the present invention.

FIG. 2 is a pictorial representation of the alertness monitoring system of FIG. 1 as installed in the cab of a locomotive.

FIG. 3 is a flow chart of the operation of the alertness monitoring system of FIG. 1.